

Problems

32.P.16 | $I = 100 \text{ A}$
 $d = 2.0 \times 10^{-3} \text{ m}$

a.) $\mu?$ $\mu = AI$

$$I = 100 \text{ A}$$

$$A = \pi (1.0 \times 10^{-3} \text{ m})^2$$

$$\mu = 3.14159 \times 10^{-4} \text{ A m}^2$$

$$\vec{\mu} = 3.14159 \times 10^{-4} \text{ A m}^2$$

$$\begin{aligned} \vec{\mu} &= 3.14 \times 10^{-4} \text{ A m}^2 \\ \vec{B} &= 5.03 \times 10^{-7} \text{ T} \end{aligned}$$

b.) \vec{B} @ $z = 5.0 \times 10^{-2} \text{ m}$

$$B = \frac{\mu_0}{4\pi} \frac{2\vec{\mu}}{z^3}$$

$$B = 5.03 \times 10^{-7} \text{ T}$$

$$\mu_0 = 4\pi \times 10^{-7}$$

$$\vec{\mu} = 3.14 \times 10^{-4} \text{ A m}^2$$

$$z = 5.0 \times 10^{-2} \text{ m}$$

32.P.18) $\vec{\mu} = 8.0 \times 10^{22} \text{ A m}^2$ $\vec{B} = ?$ at surface
 $r = 6.37 \times 10^6 \text{ m}$

a.) $B = \frac{\mu_0}{4\pi} \frac{2\vec{\mu}}{z^3}$ $B = 6.19 \times 10^{-5} \text{ T}$
 $\mu_0 = 4\pi \times 10^{-7}$
 $\vec{\mu} = 8.0 \times 10^{22} \text{ A m}^2$
 $z = 6.37 \times 10^6 \text{ m}$

b.) $\vec{\mu} = A\vec{I}$

$$A = \pi r^2$$

$$A = \pi (6.37 \times 10^6 \text{ m})^2$$

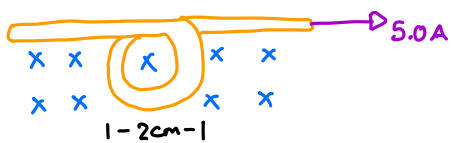
$$\vec{\mu} = 8.0 \times 10^{22} \text{ A m}^2$$

$$I = \frac{\vec{\mu}}{A}$$

$$I = 6.28 \times 10^8 \text{ A}$$

$$I = 6.28 \times 10^8 \text{ A}$$

32.P.48



$$\vec{B} = B_{\text{wire}} + B_{\text{coil}}$$

$$B_w = \frac{\mu_0 I}{2\pi d}$$

$$\mu_0 = 4\pi \times 10^{-7}$$

$$I = 10 \text{ A}$$

$$B_{\text{coil}} = \frac{\mu_0}{2} \frac{NI}{R}$$

$$d = 1.0 \times 10^{-2} \text{ m} \quad R = 1.0 \times 10^{-2} \text{ m}$$

$$B_{\text{wire}} : \frac{(4\pi \times 10^{-7})(5 \text{ A})}{2\pi(1.0 \times 10^{-2} \text{ m})}$$

$$B_{\text{coil}} : \frac{(4\pi \times 10^{-7})}{2} \frac{1(5 \text{ A})}{(1.0 \times 10^{-2} \text{ m})}$$

$$B_w = 1.0 \times 10^{-4} \text{ T} - \hat{k}$$

$$B_c = 3.14 \times 10^{-4} \text{ T} - \hat{k}$$

$$B = B_w + B_c = 4.14 \times 10^{-4} \text{ T into page}$$

$$B = 4.14 \times 10^{-4} \text{ T into page}$$

Conceptual

32.CQ.7

- a.) The initial direction is into the page
- b.) There is no direction